Capstan Servo Kit for 3M Isoloop Recorders

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A Brief History of the 3M Isoloop Transports

The 3M Isoloop transport were the first professional tape recorders designed for very low flutter. Born from a heritage of the Bing Crosby Electronics Lab (later 3M's Mincom Division), the Isoloop machines included many of the features of the instrumentation and video recorders developed by the Lab.

Two different capstan drives were used for the audio versions of the Isoloop. The Series 400, more commonly known as the Model 23, utilized a rubber tired flywheel and a pivoted motor. The original flywheel, made by audio pioneer Walter White, had incredibly low flutter. Unfortunately, nobody could duplicate this performance in production quantities. The design provided for a fine adjustment of speed, but this also allowed a slight drift in speed from beginning to end of reel.

The Model 56 overcame the drift problem by using a polyester belt to couple the motor to the capstan flywheel. The motor was solidly bolted to the chassis, with a resulting noise problem. The original Elinco motors were not particularly quiet, but the old design suspended the motor with rubber damping that isolated the motor vibrations from the frame. This new design, with the motor rigidly attached, required a new motor. Ashland motors used in Ampex recorders were much quieter, so a custom Ashland motor was incorporated into the Model 56.

The Model 64 adopted the belt drive technique and changed the styling of the electronics modules to match the Model 56's dark gray paint scheme.

The Model 79 adopted a new capstan motor with servo control. The motor was already being used in a 3M Thermofax paper copier! The belt drive was retained. A novel tachometer of barium ferrite provided the speed information. Unfortunately, 3M chose to use a voltage controlled oscillator as the primary frequency reference rather than a crystal oscillator. The VCO was plagued by drift due to temperature and voltage fluctuation. The deck could be locked to external references by a synchronizer that provided a varying DC control voltage to the VCO.

The Conversion to Direct Drive

The direct drive kit is a spin-off of a special project for Disney's EPCOT Center. Their bin loop reproducers utilized a 'pancake' motor with a printed circuit rotor similar to the motors used in the Ampex MM-series of recorders. This motor has no moving iron, yielding very low armature inductance and very long brush life.

The motor is mounted onto the base of the capstan bearing housing in the area formerly occupied by the flywheel. Three tapped mounting holes are easily added to the base of the housing with the

assistance of a special drilling guide. A 1200-line glass tachometer is sandwiched into the assembly for direct speed readout.

The electronics package is a self-contained unit with power supply, heat sinks and control circuitry. The crystal controlled phase lock circuits permit 3 operating speeds - 7 1/2, 15, and 30 ips. Simple wiring to the existing Speed Select switch on the transport provides High Speed/Low Speed selection. An additional button on the servo chassis selects the 7 1/2/15 or 15/30 ranges. An additional wire provides a Start/Stop command so that the capstan runs only when tape is playing. Thanks to the smooth acceleration of the capstan, the Model 23 transports no longer need the delay dashpot on the ingoing pinch roller linkage.

Provisions are included for an optional remote control and tape speed readout with 2 decimal point accuracy.. The remote control connector accepts a nominal 9600 Hz frequency for synchronization and varispeed operation.